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Scrumban

by

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A report submitted to the graduate faculty in partial
fulfillment of the requirements for the degree of
MASTER OF SCIENCE

Major: Computer Science

Program of Study Committee:
Christopher J Seeger, Co-major Professor
Shashi Gadia, Co-major Professor
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Iowa State University

Ames, Iowa

2018

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ABSTRACT

To deliver a project of any magnitude successfully and on time, good project management is a necessity. This is especially true in software development. Project planning, scheduling and tracking are important activities of project management. ^[3] A critical part of project planning is to itemize the tasks, develop an initial schedule and assign team members as needed to accomplish those tasks. As development progresses, it is important to monitor the completion of those tasks, to review the associated products and to determine if changes, alternative plans, or reassignments are required. Effective tracking of projects and tasks helps software teams focus on priorities and allocate resources wisely.

Scrumban is a project management application developed for project and task tracking. This report presents the design and assessment of this tool. The interface helps developers collaborate, plan projects and manage tasks. The main targeted user-group of this application is the department of Extension and Outreach at Iowa State University. The major theme of this application is to increase efficiency in developing, recording and tracking of projects with improved visibility and immediate access to information.

CHAPTER 1. INTRODUCTION

1.1 Background

Software development is a highly complex process, with a myriad of variables affecting the system. A good plan reduces risk, uncertainty, and supports better decision making. Scrum is a process framework that has been used to manage complex product development since early 1990s. It helps people address complex adaptive problems, while productively and creatively delivering products of the highest possible value. ^[1] Scrum methodology defines scrum team as its minimal functional unit. Each functional team serves a specific purpose and is essential to Scrum's success and usage.

Kanban is a scheduling system for lean manufacturing and just-in-time manufacturing. ^[2] Kanban has five main principles: visualize workflow, limit work in progress, measure and manage flow, make process policies explicit, and use models to recognize improvement and opportunities. Kanban focuses on communication, collaboration and integration between software developers, testers and support teams, resulting in rapid software development and continuous delivery to the customer. ^[2]

With a shift to agile methodologies, the traditional ways of managing projects like Gantt project plans, whiteboards, yellow post-it notes etc are no longer able to provide the real-time visibility needed in demanding project schedules.

Traditionally, Software Development organizations use the following tools to manage their project schedules and tasks:

- MS-Word documents, MS-Excel spreadsheets or standalone requirements capture tools
- High-level project plan (GANTT chart) developed in tools such as Microsoft Project, Primavera and printed out for reference
- Project estimates prepared using a combination of the high-level project plan and specialized standalone MS-Excel spreadsheets

As the static project plans, have become replaced by the more flexible agile approach, the old set of task management software tools no longer work:

- The project schedule is constantly evolving, with tasks being reallocated to different iterations and team members re-estimating the number of requirements and associated tasks they can complete in a given timeframe
- With the evolving teams, there is need for common platform for better visibility of the project status and progress.
- Defects, tasks and requirements need to be managed in the same environment, with the project estimates and schedules taking account of both at all times.

1.2 Project Objective

This project is developed to:

- Provide a hassle free and effective medium to manage projects and tasks for the department of Extension and Outreach
- Provide a medium for individual or groups of individuals to collaborate for the accomplishment of collective goals of a project.
- Provide improved visibility and immediate access to information

- Monitor and track project tasks and processes

1.3 Report Organization

The rest of the report is organized as follows. Chapter 2 gives an overview of the project, the software description, its architecture and implementation. Chapter 3 shows the results of the work. Chapter 4 explains the impact, future scope. Chapter 5 provides the conclusion.

CHAPTER 2. SCRUMBAN

2.1 Overview

2.1.1 Architecture

The application consists of the following components.

User Interface: The user interface is a dashboard to visualize the different components which are as follows:

- a. **Tasks:** Each task is like a card that gives brief information about the task. Additionally, checklist can be created for a task and members can be assigned to a task.
- b. **Boards:** Scrumban essentially consists of 5 boards – ‘Parking lot’, ‘To do’, ‘Waiting’, ‘Work in progress’ and ‘Done’.
- c. **Programs, Activities and Projects:** Programs, activities and projects are entities that are interlinked with one another, with programs being on top of the hierarchy. Each program has any number of activities associated with it and each activity has multiple projects associated with it.
- d. **Users:** Users of Scrumban are the members of the project teams. Only certain users are allowed to add projects, activities and programs. All users can view, add and edit tasks.

PHP queries are made to the MySQL database via ajax calls to load up information on the dashboard.

2.1.2 Software Description

Scrumban’s user Interface is developed using jQuery, HTML, CSS, Bootstrap. jQuery is a JavaScript library with powerful ajax API, and DOM manipulation abilities. Most of the filtering, and UI changes

are simply handled via ajax. MySQL is used as the database engine. Request is made to the PHP files via ajax. A query is made to the MySQL table from the PHP files which returns results that are fetched by ajax and displayed.

2.2 Implementation

The application is a simple one, for task management. This is a single page application which contains dashboard that displays various tasks that belong to different projects, activities and programs. These data are taken from Tasks table. An ajax call to the php file to get the task data from Tasks table is made. These tasks are then filtered into the various boards based on their status. The tasks can be dragged and dropped from one board to another using jQuery UI draggable and droppable methods. These methods allow the DOM elements to be dragged and dropped with the help of mouse anywhere within the view port. The task cards are colored in a way to distinguish based on the program they belong to. If no program has been assigned to a task, the default color is LightPink.

The page also contains an add button which can be used to add new project, activity, program or task, the details of which are entered into the respective tables in the MySQL database using ajax calls to the PHP files. A task can be added by any user, while a project/ activity/ program can only be added by authorized users. This validation currently is being done using the userId which is unique for each user.

To keep the dashboard current and efficient, any task that is “Done” and is beyond a month old is archived. The tasks that need to be archived are moved from `tasks` table to `tasks_archive`. Every time the application loads up, it makes an ajax call to tasks_archive.php that inserts the archivable

tasks into `tasks_archive` and deletes the same from `tasks` table. If the archived tasks need to be viewed, there is a button 'Display archived tasks' which will load up the archived tasks from `tasks_archive` table. This button toggles to display/hide archived tasks.

To create local server, XAMPP 5.6.14 has been used. It makes setting up a local test server on laptop easier. XAMPP provides the (W)AMP stack - Apache, MySQL and PHP. It also includes PHPMyAdmin which is very useful for dealing with MySQL database.


CHAPTER 3. RESULTS

Task organization:

Scrumban provides the ability to edit and track project tasks. One can search and filter the list of tasks to quickly find those that are assigned to a particular member, which tasks have been completed or are still in progress. It gives each individual and the team an overview of the effort being put in and helps them better allocate the time towards the projects. Tasks can also be filtered based on the project, program and activities or different combinations of the aforementioned. The tasks can be dragged and dropped across different boards such as “To do”, “Work in process”, “Done” etc depending upon their status.

Task editing

Task editing allows the task to be assigned to a different project, program or activity, assigning and removal of members on a task. Checklists are essentially simple, nested subtasks. Items within these checklists are either done or not done. Checklists allow you to create and group items within a task. A checklist can be added for a task to help stay on top of the to-do list. A task can be deleted if it is no longer relevant to the project.

SCRUMBAN 0.0.6 Links ▾ Add Display: Tasks User: All Project: All Activity: All Program: All Display archived tasks  Chris

PARKING LOT		To Do		WORK IN PROCESS	
R setup Tasksheet 🔗 TM	Election data error brief sketch report 🔗 TM	Stem GeoJSON 🔗 CS	Update IGFI Dashboard with New Data 🔗 BH	IP Plan of Work 🔗 CS	Assist Ogden Fulcrum Setup 🔗 CS
Update GIS Brochure 🔗 BH	Intro to GIS Module 🔗 BH	Build model for OSM download 🔗 AD	Families and Youth DDM 🔗 BH	IGFI debt data upload script 🔗 BH	IGFI debt data report 🔗 BH
Grade separation in pedestrian network 🔗 AD	DoE table to link data 🔗 TM	New parking lot. 🔗 CS	History tracking 🔗 CS	Implement Shibboleth authentication 🔗 SG	OpenStreet Map Editor Tasksheet 🔗 AA
pedestrian route directness in Perry 🔗 AD		task reassignment 🔗 CS	incorporate timeline/Gantt chart functions 🔗 CS	Evaluate OSM as transportation data source 🔗 AD	Mapping APIs: Leaflet - Awesome Markers Plugin - Bootstrap 🔗 BW
		Scrumban: Past due alert 🔗 CS	Scrumban: task heirarchy 🔗 CS	Basic 3D Animation with ArcGIS Pro 🔗 BW	Pedshed Walkability Ind 🔗 BH
		GeoJSON, JSON Generator 🔗	Move 4H DDM Scripts to AWS 🔗 BH	City DDM 🔗 BH	Develop List of Cities participating in various outreach programs. 🔗 CS
		testing interface 🔗 CS	testing "Create new task" 🔗 CS	Convert Act Data for SQL 🔗 TM	Enable edit button 🔗 CS
		testing "Create new task 2" 🔗 CS	Adding multiple users to a task 🔗 BH TM SG	Editing OpenStreet Map: Potlach 2 Editor 🔗 BW	debug LNR tool in arcmap 🔗 AD
		Checking multiple select users 🔗 CS	Displaying multiple members on the task 🔗 CS		Review Trans related Manuscript 🔗 CS
		Adding task 1 🔗 SG	Selected Troy, Sonal, Austin and Sandy 🔗 TM SG AD SB	QGIS - Road Graph Plugin 🔗 BW	Create Video Tutorials 🔗 AA
		Added Troy, Sonal and Austin 🔗 TM SG AD	Adding Troy, Sandy and Ahmad 🔗 SB AA	Tutorial - Interface Review 🔗 AA	Interface Tutorial Script 🔗 AA

Figure 3.1 Scrumban User Interface

SCRUMBAN 0.0.6 Links ▾ Add Dis

Create new task

Program:

Activity:

Project:

Members: Troy ▾

DoE table to link data

Need a table in SQL that has the necessary various codes for linking up ACT and other DoE data.

Figure 3.2 Task dialog box.

SCRUMBAN 0.0.6 Links ▾ Add Display: Tasks User: All Project: All Activity: All Program: All Display archived tasks

CHECKLIST

Add a step..

- ☒ Step 1
- ☒ Step 2
- ☐ Step 3

Figure 3.3 Checklist dialog box for a particular task.

CHAPTER 4. IMPACT AND FUTURE SCOPE

Impact

Scrumban can be used by the department of Extension and Outreach to collaborate on project. From managing simple to-do lists to helping teams work and collaborate better, Scrumban will help track the progress of the project. The visibility of the status and requirements of the project makes it very helpful. It allows for optimization of resource allocation. By filtering the tasks allocated to each member, one can observe the work load. It helps understand what the resources are working on, what else a person has on his plate, what work is not assigned to anyone. This is mainly important for the executives to ensure that resources are being utilized in an optimal way.

Future scope

The application can be further improved by introducing new features into the system. Prioritize and schedule requirements for each project, load-balance project resources to maximize project velocity. Users being able to enter project issues and defects during lifecycle and track issues, defects against project schedule can be helpful. View project velocity, burndown and burnup reports. Effective tracking also helps the resources to keep track of their normal work time as well as the overtime they put in.

CHAPTER 5. CONCLUSION

Planning, management and tracking are integral part of any software project. A task management tool is especially helpful for this purpose. Getting a tool that is going to improve productivity rather than creating more work than it saves is very important. Scrumban is a simple task management application that allows for the creation and assignment of tasks. Along with the current features of Scrumban, being able to prioritize and schedule requirements would make this application more prepared for real time projects and use cases.

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